INTERNATIONAL JOURNAL
OF
PHARMACEUTICAL SCIENCES
AND
RESEARCH

A RETROSPECTIVE STUDY OF PRESCRIBING PATTERN FOR ACUTE RESPIRATORY INFECTIONS IN CHILDERN IN A TERTIARY CARE TEACHING HOSPITAL

Sanjay Sankhla [*1], Suman Kanwar [1] and Dhirendra Kumar Mahawar [2]

JLN Medical College [1], Ajmer - 305001, Rajasthan, India.
NIMS [2], Jaipur - 303121, Rajasthan, India.

ABSTRACT: Objective: To study prescribing pattern for acute respiratory infections in children attending outpatient department of Paediatrics, J.L.N. Hospital, Ajmer, Rajasthan. **Material and Method:** The study was carried out retrospectively by analyzing the copies of prescriptions of patients who had visited the O.P.D. of the paediatrics department of J.L.N. Hospital Ajmer. A total of 350 prescriptions having written diagnosis ARI/URTI/common cold were selected for study. Information on demographic profile and treatment were spread over three different age groups (*i.e.* Neonates: up to one month of age, Infants: 1 month to 1year and Children: 1-14 years). Each prescription then was analyzed as per objectives of study. **Results:** Male patients were more as compared to females and most of the patients were in the age group of 1-14 years. Antihistaminics were the most frequently prescribed class of drugs (28.52%) followed by antimicrobials (26.35%). Antihistaminics constituted 63.08% of respiratory drugs prescribed. Antimicrobials were prescribed in 86.57% of the prescriptions and Cefpodoxime was the most frequently prescribed antimicrobial agent followed by Amoxicillin-clavulinic acid combination. Of total medicine formulations prescribed, 56.09% were in the form of fixed dose combinations (FDCs) and 33.30% were matching with those listed in WHO model list of essential medicines (EML). **Conclusion:** There is a scope of improvement in prescribing pattern regarding prescribing of antimicrobial agents, medicines prescribed from essential drug list and usage of fixed dose combinations.

INTRODUCTION: Infants and children constitute a large proportion of the population in developing countries. Most suffer from frequent, usually self-limiting illnesses. Acute respiratory infections (ARI), acute watery diarrhoea (ADD) and viral fever are the common childhood illnesses accounting for the major proportion of paediatric outpatient visits. Only a small proportion of these patients (<20%) require antibiotic therapy [1].

In India, the most common disease affecting children is acute respiratory infection (ARI), which is responsible for about 30-50% of visits to health facilities and for about 20-40% hospital admissions [2]. Most of the respiratory tract infections are caused by viruses and hence they resolve spontaneously with conservative management [3]. However it has been seen that drug therapy is resorted to in many of these cases without adequate justification.

Moreover, these drugs provide only symptomatic relief without any benefit in terms of shortening of duration of illness or reduction in morbidity [4]. Use of antibiotics in cases of ARIs is another area of serious concern. Antibiotic treatment is beneficial to children only if symptoms persist for 10-14 days

without improvement [5]. In present scenario antibiotic is a highly misused medicine [6]. Despite a downward trend in antibiotic prescribing in recent years, over prescribing of antibiotics for ARIs in children persists. This inappropriate use of antimicrobial agents (AMAs), has contributed largely to the development of antibiotic resistance.

Though irrational prescribing is known throughout the world, but in developing countries because of small amount of funds available in the overall health budget for drugs, it has become more meaningful to prescribe drug rationally for optimum use of the allocated funds [7]. Considering these facts, this study was planned to analyze the current prescription pattern of drugs used in the treatment of ARIs in the paediatrics department of J L N Hospital, Ajmer, Rajasthan, India. Findings of this study are expected to provide relevant and useful feedback to prescribers.

MATERIAL AND METHODS: The purpose of the study was to evaluate the prescribing pattern of acute respiratory infections (ARI) in paediatrics outpatient department of J L N Hospital Ajmer with objectives of studying the:

1. Total number of prescriptions and their percentage wise distribution in different age groups. (Neonates- up to one month of age, Infants- 1 month to 1 year of age and Children-1-14 years).
2. Sex ratio (number of male and female) - As a whole and age group wise.
3. Average number of drugs per prescription.
4. Prescribing prevalence of antimicrobials.
5. Prescribing frequency of fixed dose combinations (FDCs).
6. Prescribing by trade / generic name.
7. Percentage of drugs prescribed from WHO Essential Drug List (EDL).

The study was carried out retrospectively by analyzing the copies of prescriptions of patients who had visited the OPD of the paediatrics department of J.L.N. Hospital, Ajmer. Before starting study a written approval for the protocol from Principal, Head of paediatric department was obtained. Monthly 125 carbon copies of the prescriptions were collected randomly from paediatric OPD from January 2010 to May 2010.

Thus, from 625 prescriptions collected, 350 prescriptions having written diagnosis ARI/ URI/ Common cold were selected for study. To avoid undue bias of the physicians during prescribing to a patient, the prescription copies were obtained from the office of paediatric department. Information on demographic profile and treatment were spread over three different age groups. Each prescription then was analyzed as per objectives of study.

RESULTS: Among the total of 350 patients, 58 % were males where as 42 % were females. **Table 1** shows age wise distribution of prescriptions. Most of the patients (56.57 %) were in the age group of 1- 14 years.

TABLE 1: NUMBER OF PRESCRIPTIONS - AGE GROUP WISE

Age group	Total No. of Prescriptions (%)	Male	Female
(Neonates) Upto 1 Month	13 (3.71)	8	5
(Infants) 1-12 Months	139 (39.72)	53	45
(Children) 1-14 Years	198 (56.57)	142	97
Total	350	203	147

Table 2 shows WHO prescribing indicators. Total 1150 medicinal formulation were prescribed. The average number of drug per prescription was 3.28. Out of total medicinal formulation prescribed, 56.09% were in the form of fixed dose combinations.

TABLE 2: PRESCRIBING INDICATORS

Parameter	No.
Total number of prescriptions	350
Total number of drugs/ medicinal formulations prescribed	1150
Average number of drugs per prescription	3.28
Prescriptions with antibiotic prescribed (%)	303 (86.57%)
Number of fixed dose combinations (FDCs) prescribed (%)	645 (56.09%)
Number of medicinal formulation from EDL (%)	383 (33.30 %)
Number of FDCs from EDL (%)	93 (14.42 %)

Table 3 shows prescribing prevalence of various groups of drugs. Respiratory drugs prescribed most frequently (45.22%) followed by antimicrobial agents (26.35%).

TABLE 3: PRESCRIBING PREVALENCE OF DIFFERENT CLASSES OF DRUGS

Drug Classes	Total no.	% (n= 1150)	No. of FDCs	% (n= 645)
Antimicrobials	303	26.35	93	14.42
Analgesic- Antipyretics	241	20.95	87	13.49
Respiratory Drugs	520	45.22	418	64.81
Other drugs	86	07.48	47	7.29
Total	1150	100	645	100

Table 4 shows prescribing prevalence of various group of drugs included within the group of respiratory drugs. Antihistaminic drugs prescribed most frequently (63.08%) within the group of respiratory drugs as well as among the all drug groups prescribed during study (28.52%).

TABLE 4: PRESCRIBING PREVALENCE OF RESPIRATORY DRUGS

Drug Classes	Total no.	Percentage (%)		No. of FDC	Percentage (%)	
		Within Group	As a Whole (n=1150)		Within Group	As a Whole (n=645)
Antihistaminic	328	63.08	28.52	279	66.75	43.25
Bronchodilators	154	29.61	13.39	127	30.38	19.69
Steroid	38	7.31	3.30	12	2.87	1.86
Total	520	100	45.21	418	100	64.80

Table 5 shows prescribing prevalence of various antihistaminic drugs. Of total antihistaminic drugs prescribed, 66.75% were in the form of FDCs. FDC of Phenylephrine with Chlorpheniramine was prescribed most frequently (24.69%).

TABLE 5: PRESCRIBING PREVALENCE OF ANTIHISTAMINIC DRUGS

Agents	Total No. (%)
Phenylephrine + Chlorpheniramine	104 (31.71%)
Phenylephrine + Chlorpheniramine + Paracetamol	96 (29.27%)
Chlorpheniramine + Dextromethorphan	79 (24.09 %)
Cetrizine	25 (7.62%)
Chlorpheniramine	15 (4.57%)
Fexofinadine	09 (2.74%)
Total	328 (100%)

Table 6 shows prescribing prevalence of antimicrobial agents (AMAs). Cefpodoxime was the most frequently prescribed (35.98%) AMA.

TABLE 6: PRESCRIBING PREVALENCE OF ANTIMICROBIAL AGENTS (AMAS)

Agent	Total No. (%)
Cefpodoxime	109 (35.98 %)
Amoxicillin-Clavulinic Acid	93 (30.69 %)
Azithromycin	69 (22.77 %)
Cefixime	16 (5.28%)
Roxithromycin	08 (2.64 %)
Amoxicillin	08 (2.64 %)
Total	303

Table 7 shows essential status of medicinal formulations and of fixed dose combinations (FDCs). FDCs constituted 71.97 % of total non essential drugs prescribed.

TABLE 7: ESSENTIAL STATUS OF MEDICINAL FORMULATIONS AND FIXED DOSE COMBINATIONS (FDCS)

Parameter	Essential	Non essential	Total	FDCs as % of total non essential medicines
Medicinal Formulations	383 (33.30 %)	767 (66.70%)	1150	
FDCs	93 (14.42 %)	552 (85.58 %)	645	71.97 %

DISCUSSION: In India, acute respiratory infections are the leading cause of child mortality (30%) followed by diarrhoeal diseases (20%) [8]. In our study we also found this fact as more than half of the total prescriptions collected (56%) accounted for the acute respiratory infections. A total of 1150 medicinal formulations were prescribed in the present study. Medicinal formulations prescribed, were grouped mainly into four groups namely antimicrobial agents, analgesic-antipyretic, respiratory drugs and other drugs. Respiratory drugs included - antihistaminics, bronchodilators and steroids. Class-other drugs, included-saline nasal drop, xylometazoline, multivitamins, iron+folic acid, calcium+Vitamin D, antiemetics etc.

In the present study, antihistaminics, among the respiratory drugs as well as among the whole drugs prescribed, were found to be prescribed most

frequently (63.08% and 28.52% respectively). Among the antihistaminic drugs prescribed, 66.75% were in the form of FDCs and it was the FDC of Phenylephrine with Chlorpheniramine, which was prescribed most frequently. Both first and second generation antihistaminics were prescribed. Although antihistaminics provide symptom relief, there is no conclusive evidence that they shorten the duration of symptoms. The literature offers very little support for the use of antihistaminics for the common cold [9]. While a few studies supported the use of cold preparations to alleviate symptoms of sneezing and runny nose in adolescents [10, 11], their use for children younger than five years is not evidence based [12]. In our study we also found the use of saline nasal drop which has been shown to reduce/prevent symptoms of common cold [13].

Antimicrobial agents (AMAs) were the second most frequently (26.35%) prescribed agents after antihistaminics. Among the AMAs, cefpodoxime was prescribed most frequently (35.98%). According to the National Institute of Health (NIH) pediatric treatment guideline for respiratory tract infection, penicillin is the first line antibiotic for pharyngitis; and macrolide is the drug of choice for treating cough and bronchitis [14]. In the present study penicillins and macrolides constituted 58.75% of total AMAs prescribed.

The percentage of encounters with AMAs was 86.57% in the present study as against the WHO recommendation [1] of 20% antibiotic use for these common childhood illnesses. It is quite high considering viral etiology of most of the cases of ARIs and is higher than reported by Senok *et al.,* (52%) and Ayranci *et al.,* (60%) in their studies [15, 16]. This excessive and in appropriate use of antibiotics has been a major contributor to the ever-growing problem of antibiotic resistance. Reducing inappropriate antibiotic use is thought to be the best way to control resistance. Among the analgesic-antipyretics, paracetamol was prescribed most frequently (52.70%), followed by its combination with ibuprofen (26.97 %).

Polypharmacy: It is expressed as number of drugs per prescription. It is an important index of the scope for review and educational intervention in prescribing practices. In the present study on an average 3.28 drugs were prescribed per prescription which is higher than the recommended value of 2 (two) [17]. Das *et al.,* from paediatric outpatient setting reported the average number of drugs prescribed as 2.37 which is smaller than that in the present study [18]. Values under 1.4 have been reported from Italy [19] and Barcelona [20]. Prakash *et al.,* [21] and Ansari *et al.,* [22] found this number to be 5.86 and 5.05 medicines per prescription respectively in their studies. Thus it is evident that the polypharmacy and over prescribing are common in India, an economically developing country, as compared to economically developed western countries. Various reasons can account for this situation like unrealistic expectations and demand for quick relief from the patients; availability of non-essential and irrational drug combinations; and aggressive medicine promotion and unethical marketing practices of pharmaceutical companies [22]. More medicines increase the risk of drug interactions, adversely affect the patient compliance and hike the cost of treatment.

In our study prescribing by brand name dominated as, of total 1150 medicine formulations prescribed, 86.61%, (996) were prescribed by brand names whereas only 13.39% (154) were prescribed by official/generic names. Prescribing medicines by official names avoids the confusion and makes the drug therapy rational and cheaper. Moreover in the teaching institutions world over, in textbooks, in scientific journals and in the research publications, medicines are always mentioned by official names. Despite this, most doctors prescribe the medicines by their brand names. The reasons for this could be (i) tradition, (ii) aggressive medicine promotion by brand name, (iii) availability of multi-ingredient fixed dose drug combinations etc.

Essential medicines and rational use of medicines are two sides of a coin -inseparable from each other and mutually dependent. Increase in the use of essential medicines makes the medicine therapy more rational [23]. In our study (**Table 7**) 33.30% of total medicine formulations, were matching, with those listed in WHO model list of essential medicines (EML) [24], whereas remaining 66.70% medicine formulations could be constructed as nonessential.

A fixed dose combination (FDC) refers to the combination of two or more drugs in a single pharmaceutical formulation. The rationality of FDCs should be based on certain aspects such as [25]:

➢ The drugs in the combination should act by different mechanisms.
➢ The pharmacokinetics must not be widely different.
➢ The combination should not have supra-additive toxicity of the ingredients.

Unfortunately, many FDCs being introduced in India are usually irrational. The most pressing concern with irrational FDCs is that they expose patients to unnecessary risk of adverse drug reactions.

In our study of total medicinal formulations prescribed, 56.09% were in the form of fixed dose combinations (FDCs). Most of the FDCs were of cough syrup/anti-cold preparation. Among the respiratory drugs 64.81% of the medicine formulations were in the form of FDCs and none of them is included in WHO list of essential medicine [24]. Combinations found were mostly of antihistamines with decongestants. Similarly combinations of antitussive with expectorants were also found, both of these drugs act in opposite direction and their combination in a preparation is highly unjustified. However there are certain combinations which are rational yet not included in essential drug list, like combination of β2-agonist with inhaled corticosteroid.

Similarly among the analgesic-antipyretics, 36.10% medicine formulations were in the form of FDCs and none of them is present in WHO list of essential medicine. The combinations used were of paracetamol with ibuprofen and with nimesulide. In India, a variety of NSAID combinations are available, often as over the counter products. Combining two NSAIDs does not and cannot improve the efficacy of treatment. It only adds to the cost of therapy and more importantly, to the adverse effects [26].

Among the AMAs rational drug combination used was of Amoxicillin with Clavulanic Acid which is included in WHO list of essential medicine. Apart from these fixed dose combinations, FDCs of iron with folic acid, calcium with vitamin-D and multivitamins were also found in present study but they are not included in WHO list of essential medicine.

CONCLUSION: Average number of drugs per prescription found to be more than the recommended. This should be decreased. There is a lot of scope for improvement in case of medicines prescribed by generic name. Percentage of medicines prescribed from EDL should be encouraged. Prescribing of fixed dose combinations that are not included in essential drug list and are of doubtful rationality, should be stopped. The proportion of prescriptions containing antibiotic was quite high in the present study as against the WHO recommendation of antibiotic use for the common childhood illnesses. This should be decreased.

Thus, the study of drug prescribing pattern is an essential part of medical audit which seeks to monitor, evaluate and, if necessary suggest modification in prescribing practices of medical practitioners so as to make medical care rational and cost effective.

CONFLICT OF INTEREST: None

REFERENCES:

1. WHO: The management of acute respiratory infections in children, practical guidelines for outpatient care, World Health Organisation, Geneva. 1995.
2. Bukhari S, Gaash B, Ahmad M and Farheen A: Indian Journal for the Practicing Doctor. 4(6): 01-02.
3. Ghai OP, Paul VK and Bagga A: Disorders of respiratory system. Essential Pediatrics. U7 2009; 7: 351-2.
4. Cotton MF, Innes S and Jaspan H: Management of upper respiratory tract infections in children. S Afr FAM Pract 2008; 50(2): 6-12.
5. Rosentein N, Phillips WR, Gerber MA, Marcy MS, Schwartz B and Dowell SF: The Common Cold – Principles of judicious Use of Antimicrobial Agents. Pediatric 1998; 101: 181-184.

6. Chaurasia RC: Medication errors in children. IAP Bulletin Academy today September 2006; (3): 28-29.

7. Rehana HS, Nagarani MA and Rehan M: A study on the drug prescribing pattern and use of antimicrobial agents at a tertiary care teaching hospital in eastern Nepal. Indian Journal of Pharmacology 1998; 30: 175-80.

8. WHO: Mortality Country Fact Sheet. 2006.

9. Luks D and Anderson MR: Antihistamines and the common cold; a review and critic of the literature. J Gen Intern Med 1996; 11: 240-4.

10. Gwaltney JM, Park J and Paul RA: randomized controlled trial of Clemastine fumarate for the treatment of experimental rhino virus cold. Clin Infect Dis 1996; 22: 656.

11. Turner RB, Sperber SJ and Sorrentioo JV: Effectiveness of Clemastine fumarate for treatment of rhinorrhoea and sneezing associated with the common cold. Clin Infect Dis 1997; 25: 824-30.

12. English Ja and Bauman KA. Evidence based management of upper respiratory infection in a family practice teaching clinic. Fam Med 1997; 29: 38-41.

13. Tano L and Tano K: A daily nasal spray with saline prevents symptoms of rhinitis. Acta Otolaryngol 2004; 124(9): 1059-62.

14. Nice: Respiratory tract infections – antibiotic prescribing Prescribing of antibiotics for self-limiting respiratory tract infections in adults and children in primary care. National Institute of Health and Clinical Excellenece. 2008; 1–122.

15. Ayranci U, Akgun Y, Unluoglu I and Kiremitci A: Antibiotic prescribing patterns for sore throat infections in a university-based primary care clinic. Ann Saudi Med 2005; 25(1): 22–8.

16. Senok AC, Ismaeel AY, Al-Qashar FA and Agab WA: Pattern of upper respiratory tract infections and physicians' antibiotic prescribing practices in Bahrain. Med Princ Pract 2009; 18(3): 170–4.

17. Karande S, Sankhe P and Kulkarni M: Patterns of prescription and drug dispensing. Indian J Pediatr 2005; 72: 117-21.

18. Das B, Sarkar C and Majumder AG: Medication use for pediatric upper respiratory tract infections. Fundam Clin Pharmacol 2006; 20(4): 385–90.

19. Nwolisa CE, Erinaugha EU and Ofoleta SI: Prescribing practices of doctors attending to under fives in a children's outpatient clinic in Owerri, Nigeria. J Trop Pediatr 2006; 52: 197-200.

20. Walsh KE, Kaushal R and Chessare JB: How to avoid pediatric medication errors: a user's guide to theliterature. Arch Dis Child 2005; 90: 698-702.

21. Prakash O, Mathur GP, Singh YD and Kushwalia KP: Prescription audit of under six children living in periurban areas. Indian Pediatr 1989; 26: 900-04.

22. Ansari KU, Singh S and Pandey RC: Evaluation of prescribing pattern of doctors for rational drug therapy. Indian J Pharmacol 1998; 30: 43-46.

23. Desai S: Essential drugs and rational drug therapy. Bull Soc Rational Ther 2001; 12: 27.

24. WHO Model List of Essential Medicines for Children 2nd List (Updated) March 2010.

25. Amitava S: Indian market's fixation with fixed dose combinations (Editorial) Rational Drug Bulletin. 2002; 12: 1.

26. Burke A, Smyth E and Gerald GAF: Analgesic-antipyretic agents; pharmacotherapy of gout. In: Brunton LL, Lazo JS, Parker KL, editors. Goodman and Gilman's the Pharmacological Basis of Therapeutics.11 New York: Mc Graw-Hill. 2006; 685.